

1 CLAIMS

2 1. A method comprising:

3 receiving a request to write data to a logical sector address of a flash
4 memory medium;

5 assigning a free physical sector address to the logical sector address
6 forming a corresponding relationship between the addresses;

7 storing the corresponding relationship between the addresses in a data
8 structure; and

9 writing the data into a physical sector of the flash memory medium at a
10 location indicated by the free physical sector address.

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12 2. The method as recited in Claim 1, wherein the data structure is contained in
13 at least one memory device other than the flash memory medium.

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15 3. The method as recited in Claim 1, wherein the data structure is contained in
16 a random access memory device.

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18 4. The method as recited in Claim 1, wherein the request is received from a
19 file system.

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21 5. The method as recited in Claim 1, further comprising storing the logical
22 sector address in the physical sector of the flash memory medium along with the
23 data.

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25 6. The method as recited in Claim 1, further comprising:

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1 storing the logical sector address in the physical sector of the flash memory
2 medium along with the data;

3 if the data structure is erased, then scanning the flash memory medium to
4 locate the logical sector address stored with the data;

5 assigning the physical sector address containing the data to the logical
6 sector address forming a reestablished corresponding relationship between the
7 addresses; and

8 storing the reestablished corresponding relationship between the addresses
9 in a new data structure.

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11 7. One or more computer-readable media comprising computer-executable
12 instructions that, when executed, perform the method as recited in Claim 1.

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14 8. A method, comprising:

15 receiving a request to retrieve data stored in the flash memory medium
16 from a location indicated by a logical sector address;

17 locating a physical sector address corresponding to the specific logical
18 sector address from a data structure; and

19 reading the data stored in the flash memory medium from the physical
20 sector address retrieved from the data structure.

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22 9. The method as recited in Claim 8, further comprising:

23 storing the logical sector address with the data in the flash memory medium
24 at a location indicated by the physical sector address;

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1 reestablishing a portion of the data structure in the event of a power
2 interruption, by scanning the physical sector address for the associated logical
3 sector address; and

4 storing the logical sector address in the data structure at a location
5 corresponding to the physical sector address.

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7 10. The method as recited in Claim 8, wherein the request is received from a
8 file system.

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10 11. The method as recited in Claim 8, wherein the data structure is maintained
11 by a flash abstraction logic of a flash memory driver.

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13 12. The method as recited in Claim 8, wherein reading the data is performed by
14 a flash media logic of a flash memory driver.

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16 13. The method as recited in Claim 8, further comprising storing the data
17 structure in a volatile memory device.

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19 14. The method as recited in Claim 8, the method being performed by a flash
20 memory driver.

21
22 15. A method, comprising:
23 receiving a request to write data to a logical sector address of a flash
24 memory medium;
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1 assigning a physical sector address to the logical sector address forming a
2 corresponding relationship between the addresses;

3 storing the corresponding relationship between the addresses in a data
4 structure;

5 writing the data into a physical sector of the flash memory medium at a
6 location indicated by the physical sector address; and

7 writing the logical sector address in the physical sector of the flash memory
8 medium along with the data.

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10 16. The method as recited in Claim 15, further comprising:

11 if the data structure is erased, then scanning the flash memory medium to
12 locate the logical sector address stored with the data;

13 assigning the physical sector address containing the data to the logical
14 sector address forming a reestablished corresponding relationship between the
15 addresses; and

16 storing the reestablished corresponding relationship between the addresses
17 in a new data structure.

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19 17. The method as recited in Claim 15, wherein writing the logical sector
20 address in the physical sector of the flash memory medium includes writing the
21 logical sector address into a spare portion of the physical sector.

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23 18. The method as recited in Claim 15, wherein the data structure is contained
24 in at least one memory device other than the flash memory medium.
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1 19. The method as recited in Claim 15, wherein the data structure is contained
2 in a random access memory device.

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4 20. The method as recited in Claim 15, wherein the request is received from a
5 file system.

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7 21. One or more computer-readable media comprising computer-executable
8 instructions that, when executed, perform the method as recited in Claim 15.

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10 22. A method comprising:

11 (a) receiving a request to write data to a logical sector address of a flash
12 memory medium;

13 (b) assigning a physical sector address to the logical sector address
14 forming a corresponding relationship between the addresses;

15 (c) storing the corresponding relationship between the addresses in a
16 data structure;

17 (d) writing the data into a physical sector of the flash memory medium
18 at a location indicated by the physical sector address;

19 (e) receiving a request to rewrite updated data to the logical sector
20 address;

21 (f) assigning a new physical sector address to the logical sector address
22 forming a corresponding relationship between the new physical sector address and
23 the logical sector address;

24 (g) storing the corresponding relationship between the addresses from
25 the aforementioned paragraph (f) in the data structure;

1 (h) writing the updated data into a physical sector of the flash memory
2 medium at a location indicated by the new physical sector address; and

3 (i) marking the physical sector address from the aforementioned
4 paragraph (b) as dirty.

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6 23. The method as recited in Claim 22, wherein the data structure is contained
7 in at least one memory device other than the flash memory medium.

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9 24. The method as recited in Claim 22, wherein the data structure is contained
10 in a random access memory device.

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12 25. The method as recited in Claim 22, wherein the requests are received from
13 a file system.

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15 26. The method as recited in Claim 22, wherein the data structure is maintained
16 by a flash abstraction logic of a flash memory driver.

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18 27. One or more computer-readable media comprising computer-executable
19 instructions that, when executed, perform the method as recited in Claim 22.

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21 28. A system, comprising:

22 flash medium logic, configured to store data in a physical sector of a flash
23 memory medium;

24 a table, configured to map logical sector addresses received from a file
25 system to physical sector addresses on the flash memory medium; and

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1 flash abstraction logic, configured to ascertain a next free physical sector on
2 a flash memory medium and assign an address associated with the free physical
3 sector to a logical sector address associated with a write request received from the
4 file system.
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6 29. The system as recited in Claim 28, wherein the flash abstraction logic is
7 further configured to update the map of the logical sector addresses to the physical
8 sector addresses, after assigning the address associated with the free physical
9 sector to the logical sector address associated with the write request.
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11 30. The system as recited in Claim 28, wherein the flash medium logic marks a
12 physical sector address as dirty after contents associated with the physical sector
13 address are rewritten to a new physical sector address.
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15 31. The system as recited in Claim 28, wherein the flash medium logic is
16 further configured to store the logical sector address within a portion of the
17 physical sector associated with the write request.
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19 32. The system as recited in Claim 28, wherein the flash medium logic is
20 further configured to:

21 store the logical sector address within a portion of the physical sector
22 associated with the write request; and

23 scan the flash memory medium for the portion of the physical sector storing
24 the logical sector address after initialization of the system.
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33. The system as recited in Claim 28, wherein the table is contained in a memory device other than the flash memory medium.

34. The system as recited in Claim 28, wherein the table is contained in a random access memory device.

35. The system as recited in Claim 28, wherein the system is a flash driver system.

36. A computer-readable medium for a flash driver, comprising computer-executable instructions that, when executed, direct the flash driver to:

receive a request to write data to a logical sector address of a flash memory medium;

assign a physical sector address to the logical sector address forming a corresponding relationship between the addresses;

store the corresponding relationship between the addresses in a table; and

write the data into a physical sector of the flash memory medium at a location indicated by the physical sector address.

37. A computer-readable medium for a flash driver, comprising computer-executable instructions that, when executed, direct the flash driver to:

receive a request to write data to a logical sector address of a flash memory medium;

assign a physical sector address to the logical sector address forming a corresponding relationship between the addresses;

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1 store the corresponding relationship between the addresses in a table;
2 write the data into a physical sector of the flash memory medium at a
3 location indicated by the physical sector address;
4 write the logical sector address in the physical sector of the flash memory
5 medium along with the data;
6 if the table is erased, then scan the flash memory medium to locate the
7 logical sector address stored with the data;
8 assign the physical sector address containing the data to the logical sector
9 address forming a reestablished corresponding relationship between the addresses;
10 and
11 store the reestablished corresponding relationship between the addresses in
12 a new table.

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14 38. A system for tracking sectors in a flash memory medium, comprising:
15 means for receiving a request to retrieve data stored in the flash memory
16 medium from a location indicated by a logical sector address;
17 means for locating a physical sector address corresponding to the specific
18 logical sector address from a table; and
19 means for reading the data stored in the flash memory medium from the
20 physical sector address retrieved from the table.

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22 39. The system as recited in Claim 38, further comprising:
23 means for storing the logical sector address with the data in the flash
24 memory medium at a location indicated by the physical sector address;
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1 means for reestablishing a portion of the table in the event of a power
2 interruption, by scanning the physical sector address for the associated logical
3 sector address; and

4 means for storing the logical sector address in the table at a location
5 corresponding to the physical sector address.

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7 40. The system as recited in Claim 38, wherein the request is received from a
8 file system.

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10 42. The system as recited in Claim 38, wherein the table is maintained by a
11 flash abstraction logic of a flash driver.

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13 43. The system as recited in Claim 38, wherein the means for reading of the
14 data is performed by flash media logic of a flash driver.

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16 44. The system as recited in Claim 38, wherein the memory device is a type of
17 random access memory.

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19 45. A flash driver system, comprising:

20 a free sector manager, configured to determine a next free physical sector
21 address on the media and assign the address to a logical sector address of a write
22 request received from a file system,

23 a table, configured to store a map showing the assignment of the physical
24 sector address to the logical sector address; and
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1 a flash medium logic, configured to write the data to the next free physical
2 sector indicated by the free sector manager and store the logical sector address
3 directly with the data on the flash memory medium.

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5 46. The flash driver as recited in Claim 45, further comprising a flash
6 abstraction logic, configured to scan the sectors of the flash memory medium for
7 the logical sector address and note the physical sector address from which the
8 logical sector address is stored and reestablish the map in the table in the event the
9 table is erased.

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11 47. The flash driver as recited in Claim 45, wherein the logical sector address is
12 stored in a spare portion of the flash memory medium.

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14 48. A flash driver system, comprising:
15 a free sector manager, configured to determine a next free physical sector
16 address available on the flash memory medium;
17 a flash abstraction logic, configured to query the free sector manager for the
18 next free physical sector address and link the physical sector address to a logical
19 sector address received from a file system; and
20 a table, configured to store the physical sector address to logical sector
21 address linking performed by the flash abstraction logic.

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23 49. The flash driver system as recited in Claim 48, wherein the flash
24 abstraction logic is further configured to mark an existing physical sector as dirty,
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1 if a logical sector address received from the file system was previously linked to
2 the logical sector address in the table.

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4 50. The flash driver system as recited in Claim 48, wherein the flash
5 abstraction logic is further configured to mark an existing physical sector as dirty,
6 if a logical sector address received from the file system was previously linked to
7 the logical sector address in the table, but only after data associated with the
8 logical sector address is successfully written to a new physical sector address on
9 the flash memory media.

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11 51. The flash driver system as recited in Claim 48, wherein a portion of a
12 physical sector is a status bit configured to indicate when a write operation is in
13 progress.

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15 52. The flash driver system as recited in Claim 48, wherein a portion of
16 physical sector is a status bit configured to indicate when a write operation has
17 been completed successfully.
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